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NLO dye compositions and use thereof in producing NLO elements

Description of Technology: This invention relates to nonlinear optical (NLO) dyes and their use in combination with polymer hosts in nonlinear optical elements.

Patent Listing:

1. US Patent No. 5,534,201**,** Issued on July 9, 1996, "NLO dye compositions and use thereof in producing NLO elements."
http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=5,534,201.PN.&OS=PN/5,534,201&RS=PN/5,534,201

2. US Patent No. 5,622,654**,** Issued on April 22, 1997, "NLO dye compositions and use thereof in producing NLO elements."
http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=5,622,654.PN.&OS=PN/5,622,654&RS=PN/5,622,654

Market Potential: Nonlinear optical dyes (organic molecules having large nonlinear polarizabilities) have been recognized as potentially useful as components of the optical elements in optical frequency converters and in electrooptic devices. Generally, in order for the NLO dyes to exhibit the large second order optical susceptibilities essential to nonlinear optic applications, the molecules must be constructively arrayed in a noncentrosymmetric configuration. Such molecules have been crystallized in a noncentrosymmetric space group, but this method does not work for all potentially useful molecules, and the resulting shape and properties are limited by the very nature of a crystal.

The NLO dyes have been used, for example, in combination with glassy polymers to provide nonlinear optical elements. The choice of the dye molecule and glassy polymer affects the stability of nonlinear optical effect obtained, because the dye molecules have a tendency to "relax" over time, thereby losing the configuration necessary for the enhanced nonlinear optical properties.

The electrical properties and chemical stability of a glassy polymer used in optical elements are important, since these characteristics are relevant to the efficient functioning of devices in which the nonlinear optical elements are generally employed. Thus, when choosing a host polymer for NLO dyes, pertinent properties for consideration include low water absorption, thermal and chemical stability, dielectric constant, and thermal coefficient of expansion. Polyimides are often used in electronics applications since many of their properties makes them especially suited for such uses.

Benefits:

- Certain NLO dyes have great stability of nonlinear optical effect.

Applications:

- Components of the optical elements in optical frequency converters and in electrooptic devices.
- Electronics.

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